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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/933,365	08/20/2001	Colin D. Frank	CE08239R	7134

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EXAMINER	
MEEK, JACOB M	

ART UNIT	PAPER NUMBER
2637	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/933,365	FRANK ET AL.	
	Examiner	Art Unit	
	Jacob Meek	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 3, 8,9,13-17,22,23,27-30,35,38-40* is/are rejected.

7)☒ Claim(s) *4-7,10-12,18-21,24-26,31-34,36 and 37* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1- 3, 9, 13 - 17, 23, 27- 30, 38 - 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (US Patent 6,570,864).

With regard to claim 1, Kim teaches a method for linearly filtering a received signal to form a first filtered signal (see Figure 1, reference 201, 221, Figure 2A, reference110 and column 1, lines 50 – 63, where the MMSE adaptive filter is interpreted as providing linear filtering functionality); despreading the first filtered signal (see figure 1, reference 201, 231, 251) and providing a plurality of symbol estimates for all corresponding code channels of the plurality of code channels (see figure 1, outputs of 231, 232, 23N to adding element of 240 where these outputs are interpreted as symbol estimates of code channels); generating an estimated transmitted signal from the plurality of symbol estimates (see Figure 2A, reference 130 and column 3, line 67 – column 4, line 4); generating an estimated received signal (see figure 1, 231 input which is interpreted as the output of figure 2A, reference 130) from the estimated transmitted signal (see Figure 2A, 130 output) and a channel estimate (see Figure 1, 253 input and column 3, lines 4 - 8); producing a residual signal as a difference between the received signal and the estimated received signal (see Figure 1, 201, 221, 231, 253 and column 2, lines 4 –8); linearly filtering the residual signal to form a second filtered signal (see Figure 1, 20N where this would represent the second filtering stage as previously described

by the 1st stage filtering description); combining the second filtered signal with the estimated transmitted signal to form a next estimated transmitted signal (where second stage of interference canceling unit provides identical functionality to first stage of operation, Figure 1, 20N); and despreading the next estimated transmitted signal (figure 1, 20N, provides duplicate functionality of figure 1, 201 already described) and providing a next plurality of symbol estimates for a selected code channel of the plurality of code channels (figure 1, 20N, provides duplicate functionality of figure 1, 201 already described). While Kim et al and applicant use different terminologies it would have been obvious to one of ordinary skill in the art to utilize the invention of Kim to produce an adaptive equalization device utilizing MMSE (see column 3, lines 43 – 46) on parallel data channels for the reduction of interference on parallel channels (see Abstract).

With regard to claim 2, Kim teaches filtering compromising adaptive MMSE (see column 1, lines 50 – 55).

With regard to claim 3, Kim teaches the coefficients of MMSE equalizer are adaptive to an error determined from receive signal and a pilot signal (see Column 4, line 66 – column 5, line 4 and figure 2A, 140).

With regard to claim 9, Kim teaches a second filter that is MMSE based (see figure 1, 20N, which is compromised of the elements of Figure 1, 201 (221, 231, 240).

With regard to claim 13, Kim teaches a method of estimation using a known pilot signal (see column 4, lines 4 – 16).

With regard to claim 14, Kim teaches a method of iteratively arriving at a selected level of accuracy (see column 6, lines 7 – 48 , and Figure 2D where this is interpreted as iterating until arriving at a known level).

With regard to claims 15, 16, 17, 23, and 27, the elements claimed as apparatus are the embodiment of the methods of claims 1, 2, 3, 9, and 13 respectively and are restatement of the embodied functionality and therefore would have been obvious given the aforementioned rejection of the method claims of 1 – 3, 9, and 13.

With regard to claim 28, Kim teaches an apparatus for receiving CDMA signals, which are interpreted as being the network interface for communications with a base station. Kim also teaches that his invention could be replaced with software, which would necessitate a processor and memory as claimed. The additional limitations of claim 28 are the embodiment of the methods of claim and are a restatement of the embodied functionality and therefore would have been obvious given the aforementioned rejection of claim 1.

With regard to claims 29, 30, 38, the elements claimed as apparatus are the embodiment of the methods of claims 2, 3, and 13 respectively and are restatement of the embodied functionality and therefore would have been obvious given the aforementioned rejection of the method claims of 2, 3, and 13.

With regard to claim 39, Kim teaches a method for equalizing a received signal, using MMSE equalization, to form a first filtered signal (see Figure 2A, 110, and column 3, lines 43 – 46); despreading the first filtered signal (see Figure 1, reference 251) and providing symbol estimates for all corresponding code channels (see figure 1, reference 240); generating an amplitude estimate for all corresponding code channels (see Figure 2B, and column 4, lines 24 –45) and generating a confidence measure for each symbol estimate (see column 4, lines 46 – 65 where this is interpreted as generation of confidence measure); generating an estimated transmitted signal from by weighting each symbol estimate by its corresponding confidence measure to form weighted symbols (see column 5, lines 19 – 38 where this is interpreted as equivalent functionality), and spreading weighted symbols using a

corresponding orthogonal codes (see Figure 1, blocks 221,222,22N, Figure 2C, 171, 172, 173, 179, and Column 5, line 56 – column 6, line 6 where the elements of figure 2C are interpreted as providing equivalent functionality and are duplicated in parallel elements of Figure 1), corresponding amplitude estimates (see Figure 1, blocks 221,222,22N, Figure 2B, and Column 4, lines 24 –45 where the elements of figure 2B are interpreted as providing equivalent functionality and are duplicated in parallel elements of Figure 1), and a sector spreading code (see Figure 2C, 171); generating an estimated received signal from the estimated transmitted signal and a channel estimate determined by correlation of the received signal with a known pilot signal (see column 4, line 66 – column 5, line 11 where this is interpreted as equivalent functionality); producing a residual signal as a difference between the received signal and the estimated received signal (see Figure 1, 240, 261, 262, 26N); equalizing the residual signal, using minimum mean square error equalization, to form a second filtered signal (see figure 1, outputs of 240 to input of 20N which is a duplication of the functionality of the 1st filtering stage); combining the second filtered signal with the estimated transmitted signal to form a next estimated transmitted signal (see figure 2A, 130 and outputs of 110 and 120 where this is interpreted as equivalent functionality); and despreading the next estimated transmitted signal to form a next despread signal (see Figure 1, 20N where block 231 functionality is interpreted as being repeated in this block) and, using the next despread signal, providing next symbol estimates for selected code channels (see Figure 1, 20N where block 240 functionality is interpreted as being repeated in this block). While Kim et al and applicant use different terminologies it would have been obvious to one of ordinary skill in the art to utilize the invention of Kim to produce an adaptive equalization device utilizing MMSE (see column 3, lines 43 – 46) on parallel data channels for the reduction of interference on parallel channels (see Abstract).

With regard to claim 40, the elements claimed as apparatus are the embodiment of the methods of claim 39 and are restatement of the embodied functionality and therefore would have been obvious given the aforementioned rejection of the method of claims of 39.

2. Claims 8, 22, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (US Patent 6,570,864) in view of Hwang (US Patent 6,377,611).

With regard to Claim 8, Kim is silent on linear filtering compromising multiple stage Weiner filtering. Hwang teaches an adaptive MMSE equalizer using Weiner-Hopf filtering (see column 2, lines 37 – 40 where Hwang's device provide equivalent functionality). It would have obvious to one of ordinary skill in the art at the time of invention to use an adaptive equalizer with Weiner filtering as it would provide a rapid convergence (see column 2, lines 49 – 51) and would enhance system performance by more rapidly reducing interference effects from adjacent channels.

With regard to claims 22, and 35, the elements claimed as parts of the apparatus are the embodiment of the methods of claim 8, and is a restatement of the embodied functionality and therefore would have been obvious given the aforementioned rejection of the method claim 8.

Allowable Subject Matter

3. Claims 4 – 7, 10 – 12, 18 – 21, 24 – 26, 31 – 34, 36, and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Other Cited References

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kim (US Patent 6,570,863) discloses different aspects of MMSE adaptation; Dowling (US Patent 6,782,036) discusses the use of a matrix for adapting MMSE. Fantacci, R et al (Adaptive MMSE receivers for communications in non-stationary multipath fading channel, IEEE); Latva-Aho / Juntti (LMMSE detection for DS-CDMA systems in fading channels, IEEE); Xu / Milstein (MMSE interference suppression for coded multicarrier DS-CDMA in the presence of intermodulation, IEEE) disclose techniques of MMSE adaptation for DS-CDMA.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Meek whose telephone number is (571)272-3013. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571)272-2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMM

JAYANTI PATEL
SUPERVISORY PATENT EXAMINER